

# ADA 307

## Hybrid vehicle application

Tool used in conceptual studies of combined cycle hybrid vehicles.

Ref.: 9EQ307AAZC



The goal of this equipment is to get students to know hybrid vehicle technology. The application uses the most efficient system on the market: the plug-in hybrid electric vehicle (PHEV).

The application consists of a panel showing all the parts of a hybrid vehicle and a virtual instrument panel with advanced functions for data generation, acquisition, and analysis.

This system is used to:

- Make conceptual studies in combined cycle PHEVs simulating the operation of a real vehicle on different journeys and contexts.
- Assess high-voltage electricity flows.
- Analyse the power combination of an internal combustion engine and an electric motor/generator.

It includes an application developed with MATLAB/Simulink, the user manual, and practical exercises.

## Interactive panel

The interactive panel has the same devices as a vehicle: start switch, accelerator, brakes, speed selector, A/C switch, and off-board battery charge button (plug-in).

It reproduces the different stages in an engine operation cycle (electric motor, internal combustion engine) as well as the battery pack status (charged, depleted, generator).

Two measuring positions, V1/V2, to check the parameters selected with the software:

- Battery pack charge level.
- Battery voltage.
- Battery charging current.
- Electric motor work voltage.
- Vehicle speed.

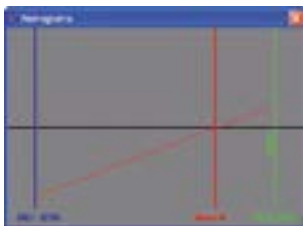
## Virtual model



The hardware trainer is a driving simulator (gear, speed, battery charge, fuel gauge). All the actions performed on the panel are represented in the software instrument panel.

The ADA307 software provides information on vehicle performance in figures, graphics, and gauges. The user can choose to view the numerical data screen, the nomogram screen, or the synoptic chart screen.

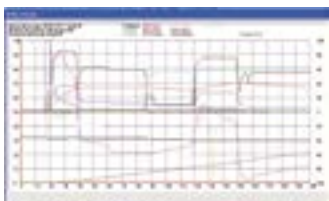
Nomogram



Synoptic graphic



Data acquisition



## Modelling with MATLAB Simulink®

It is delivered as executable software to be used with no need of a MATLAB licence, including sources.

SimulHyb offers:

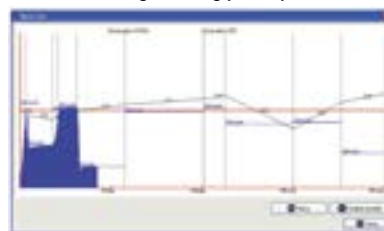
- Vehicle operating simulation (considering weight, fuel level, vehicle power, etc.)
- Energy distribution simulation:
  - in acceleration mode (consumption).
  - in braking mode (recharge).



MATLAB and Simulink® sources included

The effect of various situations on hybrid vehicle performance can be assessed by programming journeys and carrying out tests. The data can be exported to Excel.

Programming journeys



The virtual model shows all operating stages:

- Electric motor.
- Internal combustion engine.
- Electric motor + internal combustion engine and overlapping mode.
- Energy restoration and battery charging.